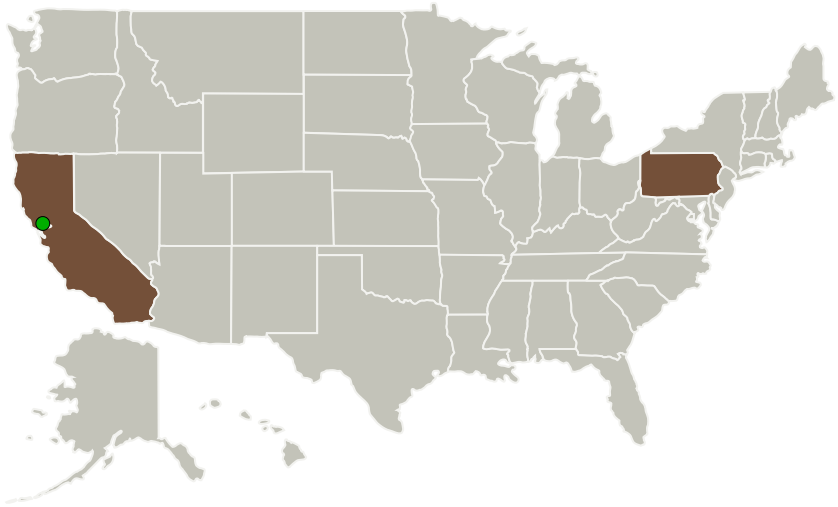
Evolutionary Autonomous Health Monitoring System (EAHMS), Phase I

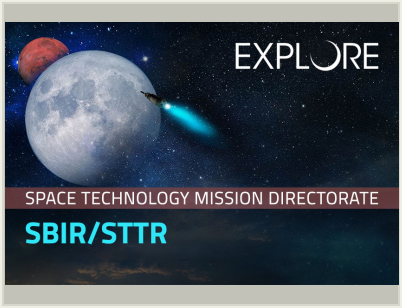
Completed Technology Project (2012 - 2013)

Project Introduction

For supporting NASA's Robotics, Tele-Robotics and Autonomous Systems Roadmap, we are proposing the "Evolutionary Autonomous Health Monitoring System" (EAHMS) for planetary exploration, which will provide an integral flexible diagnostics and prognostics framework by advanced and novel methods for determining the operational condition in on-board sensors (odometry), actuators, and power systems. In EAHMS, high performance diagnostic techniques provide a foundation for tailoring robust and accurate failure detection and identification (FDI) in key components of a robotic vehicle's locomotion system (e.g. motors, encoders, etc.). This foundation is comprised of innovative and advanced features including: (a) an enhanced collaborative learning engine (eCLE); (b) sensor health diagnostics with slippage awareness based on an Extended Kalman filter sensor fusion process; and (c) an integral system design for optimized reliability. In particular, the eCLE provides a mechanism for facilitating autonomous operation, since it includes self-learning capability. The eCLE is developed within the context of health monitoring, but will also have the capability to be applied to different domains. Another innovation is the support for electronic circuits and boards considering radiation effects.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
American GNC Corporation	Lead Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Simi Valley, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Pennsylvania

Project Transitions

February 2012: Project Start

February 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138141)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

American GNC Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

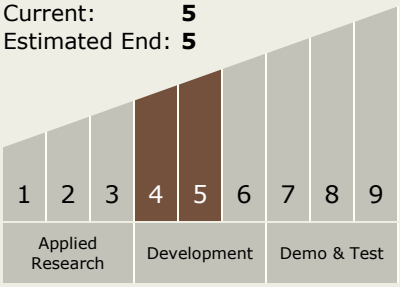
Carlos Torrez

Principal Investigator:

Tasso Politopoulos

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.4 Mission Success Technologies
    - TX13.4.5 Operations, Health and Maintenance for Ground and Surface Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System